BTEC Assignment Brief

Qualification	Pearson BTEC International Level 3 Diploma in Engineering (optional unit) Pearson BTEC International Level 3 Diploma in Mechanical Engineering (optional unit) Pearson BTEC International Level 3 Diploma in Manufacturing Engineering (optional unit) Pearson BTEC International Level 3 Extended Diploma in Engineering (Optional unit) Pearson BTEC International Level 3 Extended Diploma in Electrical/Electronic Engineering (Optional unit) Pearson BTEC International Level 3 Extended Diploma in Mechanical Engineering (Optional unit) Pearson BTEC International Level 3 Extended Diploma in Manufacturing Engineering (Optional unit) Pearson BTEC International Level 3 Extended Diploma in Aeronautical Engineering (Optional unit)
Unit number and title	**Unit 28: Dynamic Mechanical Principles in Practice**
Learning aim(s)	**C:** Explore the characteristics of lifting machines, relative velocity and periodic motion that are applied in mechanical systems.
Assignment title	3 Lifting machines, relative velocity and periodic motion in mechanical systems
Assessor	
Issue date	
Hand in deadline	

Vocational Scenario or Context	You have been working with the Senior Design Engineer as part of your apprenticeship with a company that designs and supplies complex mechanical products for a wide range of industries. The Senior Design Engineer is pleased with your work so far and has now asked you to investigate lifting machines. The Senior Design Engineer would also like you to investigate objects performing periodic motion, both practically and theoretically.

Task 1	You have been asked to investigate lifting machines and linkage mechanisms, as well as systems undergoing periodic motion **To do this:** You will carry out a series of practical activities using the available apparatus safely, in accordance with relevant risk assessments, to measure the: • Mechanical Advantage (MA), • Velocity Ratio (VR), • work input,

	• work output • efficiency of simple and complex lifting devices as directed by your tutor. You need to record the results systematically. In your report you need to include detail of the investigations carried out, including comparisons between measured values and those predicted by theory. **You should then:** Investigate two different mechanical linkage systems, one of which produces simple harmonic motion. In your report you need to include space and velocity diagrams and explanations of how the component parts move relative to each other to produce the required motion. **You also need to:** Carry out practical investigations safely, in accordance with relevant risk assessments, to measure the effect of physical parameters on the frequency of oscillation of a: a) simple pendulum b) linear mass-spring system Use the available apparatus to carry out the practical investigations and record the results systematically. In your report you need to include details of the investigations carried out. You should include comparisons between measured values and those predicted by theory and the effect that the angle of swing has on calculations relative to periodic time.
Checklist of evidence required	A report containing results gathered by experimentation and by theoretical calculation, supported by images, observation records and mathematical modelling.

Criteria covered by this task:	
Unit/Criteria reference	To achieve the criteria you must show that you are able to:
28/C.D3	Evaluate the dynamic parameters and operation of a simple and a complex lifting machine and the motion of a pendulum, a spring and a linkage mechanism that exhibit a form of simple harmonic motion, comparing the theoretical calculations to safely conducted experiments where appropriate.
28/C.M4	Determine accurately the kinetic and dynamic parameters of simple and complex lifting machines.
28/C.M5	Analyse the dynamic parameters and operation of a pendulum, a spring and a linkage mechanism that exhibit a form of simple harmonic motion, comparing the theoretical calculations to safely conducted experiments where appropriate.
28/C.P5	Determine the kinetic and dynamic parameters of a simple lifting machine.
28/C.P6	Conduct experiments safely to determine the dynamic properties of a pendulum and a spring mechanical system.
28/C.P7	Explain, using experimental results and calculations, the dynamic properties of a pendulum and a spring system.
28/C.P8	Determine the output motion of at least two linkage mechanisms for given input parameters.
Sources of information to support you with this Assignment	Books BTEC Level 3 National Engineering Student Book (Level 3 BTEC National Engineering); Buckenham et al; Pearson Education (2010); ISBN-13: 978-1292141008 Mechanical Engineering; Darbyshire A; Routledge (2010); ISBN-13: 978-0080965772 Mechanical Engineering Principles; Bird, Ross; Routledge (2014); ISBN-13: 978-1138781573 Websites miniphysics.com/a-level-physics-revision-notes-junior-college-physicsh1-h2.html Further useful resources may be found at qualifications.pearson.com/en/support/published-resources.html#step1
Other assessment materials attached to this Assignment Brief	Practical instructions for the apparatus used to carry out each of the required practical investigations.